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MEMORANDUM ON THE AGRILUS BORER INFESTATION
IN MAPLE, WASATCH NATIONAL FOREST, UTAH.

The early fall examination of maple trees in the canyons near Salt Lake City, Utah, in the Wasatch National Forest, showed that the heavy epidemic of Agrilus politus was continuing, with considerable reinestation in areas treated last spring. The stands of small maple, apparently Acer grandidentatum and A. glabrum, form the principal cover in portions of the lower canyons. These particular areas are much used for recreational purposes and the present loss resulting from the borer attacks is serious.

The continued cutting and burning of at least the dying trees in the recreation areas might be of some benefit. Such trees would be removed sooner or later and if they could be destroyed before June many beetles would be eliminated, since this type of tree very likely contains some of the heaviest broods. This cutting, under present epidemic conditions, would not prevent heavy reinestation in limited control areas, and would have to be supplemented by other methods such as spraying--if a suitable spray can be found. There was some question, at the time of examination, whether dying trees could be detected after the leaves had fallen and it seemed likely that the major part of any cutting operation would have to be delayed until spring.

However, a later examination of some of the infested trees by Associate Forester Mathews, on November 13, indicated that many of the borer larvae were being destroyed by parasites. If parasitism is already high it is possible that this natural control factor will soon reduce the epidemic, and in such a case it would be advisable to leave all infested trees to aid in the production of parasites. It is also possible that with a return of more normal precipitation many trees may be more resistant to the entrance of the young larvae, although this is uncertain since even trees near the creeks have been killed the past two seasons.

Following the reported observation of numerous parasites it was recommended that no trees be cut until a more thorough examination can be made and the percent and possible value of parasitism determined. However, there are some points in regard to the infestation in general that might will be recorded at this time.

Identity of Beetle: Mr. Evenden, of the Coeur d'Alene laboratory, reported that specimens of the adult beetle taken by him last spring and submitted to Washington were specifically identified as Agrilus politus (Say). However, it was stated that the specimens varied somewhat from those in the National Museum collection and it is possible that this will prove to be a variety of politus. Two varieties on other hosts have previously been distinguished. Only by the collection of a good series of adults from maple and

other possible hosts can it be determined whether the present beetle has characters which would distinguish it from the species.

Hosts: Agrilus politus attacks both willows and maples, and has been recorded from all sections of the United States and southern Canada. The variety, A. politus burkei, attacks alders in the West; another variety, A. politus pseudocoryli, has been reared from galls on hazel in the East. The beetle in the Wasatch Forest undoubtedly attacks both maple and willow and may have other hosts. Agrilus work was seen in birch, however, some of the emergence holes appeared slightly larger than those in maple and it is not certain that this may not be a different species. E.C.W. Forester Farmer, on the Wasatch, reported finding eggs also on cherry and boxelder but it was not determined that larvae were developing in these trees.

Distribution of Infestation: Maple stands in the following canyons, in the general vicinity of Salt Lake City, were examined on September 17 and 18 in company with Messrs. Mathews and Farmer: City Creek, Emigration, Parley's, Mill Creek, and Big Cottonwood Canyon. All showed heavy infestation. On October 6, while in American Fork Canyon, some 20 miles south of Salt Lake City, stands of maple were inspected and considerable infestation noted. The outbreak is apparently wide spread in the Wasatch Forest and may be present over much of this part of the region, wherever maple and willow occur. The epidemic has probably been building up during the past three or four years. Besides the trees in the canyon bottoms, a bushy type of maple scattered on the slopes and running high up in the side draws is also heavily infested. Stems of this bush not over a half inch in diameter had produced beetles. Under these circumstances the first difficulty of obtaining satisfactory control in limited recreation areas is evident.

Control Cutting Work: A control project, by cutting and burning infested trees, was carried on in Mill Creek between June 10 and 28, partly as an experiment. More than a mile of canyon bottom was covered and some 7,000 trees were reported treated. The earliest beetles started to emerge around June 20, at least in the lower canyon, but there were probably very few in flight while treating was in progress.

The fall examination showed that the treated area was again heavily infested, although there was probably some reduction in parts of the area. Eggs had been deposited on many healthy appearing trees and larvae were developing in many of these, as well as in trees with dead branches, and dying tops. It was reported that last year's attacks were largely confined to trees under five inches D.B.H., but this season larger trees seven to eight inches D.B.H. with smooth bark were also infested--only a small percent of the trees have a greater diameter.

Much of the reinfestation in the treated area probably come from adjacent untreated stands and the brush on the adjacent slopes and in the side draws. Many beetles were no doubt also left in dying branches and tops and in partially attacked trees which could not easily be detected. What the infestation might have been, had no control been carried on, could not be estimated. The number of attacks in this locality was probably reduced in proportion to the

number of beetles destroyed but because the epidemic was increasing this reduction was not apparent. Many trees were undoubtedly saved for the present in spite of the fact that large numbers are again infested. The control experiment indicates, however, that cutting such as carried on last spring will not prevent heavy reinfestation in limited control areas in the canyon bottoms, at least while the epidemic is on the increase.

Spray Control Work: Between July 19 and 30, Farmer with CCC and ERA crews carried out a spray control project using kerosene against the egg stage of the beetle in Mill Creek Canyon. Although some delay resulted in obtaining relief labor, a considerable area in the main canyon was again covered and it was reported that some 10,000 trees were sprayed, about a third of the area being covered twice. Only the portion of the hole showing a heavy concentration of egg masses was sprayed, the object being to reduce the amount of infestation. Some tests by Farmer just prior to the project indicated that one application of kerosene killed many of the eggs and two applications appeared to destroy most of them. It was questionable, however, where eggs had hatched prior to spraying, whether the young larvae entering the bark were destroyed.

Several of the sprayed trees were examined and found to contain live larvae. Whether these were from eggs hatched before and others deposited after the spraying, or partly from the failure of the spray itself, was not apparent. The total value of the spraying could not be judged and there was not time to attempt intensive brood counts for a comparison between treated and untreated trees. The sprayed trees showed no external evidence of injury in September from the kerosene, the smooth bark probably preventing the penetration of much oil. There is danger, however, of injuring certain tree species by the application of high concentrations of kerosene during the growing season.

Because of the long egg laying period a spray for the egg stage would not be entirely effective unless a number of applications could be made at ten day or two week intervals. One application during the maximum flight period of the beetle and one following this period might destroy a good percent of the eggs, if the spray was efficient. It was reported that the heaviest egg laying period this season probably occurred between July 12 and 25 and that incubation possibly required two weeks. Some eggs were being laid prior to this, in late June and early July, and following the maximum period deposition probably continued for several more weeks. Since the spring season this year was late it is possible that next year the beetles will emerge earlier and any spray program would have to be timed accordingly.

Continuation of Control: In the event that natural control by parasites does not look promising, it appears that artificial control by a combination of cutting and spraying would be the most effective method that could be used in recreation areas. The results that might be obtained, under present epidemic conditions, are still doubtful and could only be determined by the continuation of the large scale experiments.

Cutting and burning would be limited to dying and recently dead trees.

Where this type of infested material was removed for fuel wood during the fall and winter it would have to be utilized by late April to make certain that no beetles emerged, since development would be much earlier at lower elevations. This precaution would prevent the infestation of shade trees in the locality where the wood was utilized. The cutting of every tree showing possible evidence of infestation at this time would eliminate much of the present stand in some areas. Consequently if an efficient spray could be applied to the infested green trees many of them might be saved. This of course would require annual control until the epidemic died down.

Spray Experiments: The egg and young larva^s stages of the *Agrilus* beetle are probably the most susceptible to sprays. Recent experiments with other borers have indicated that fall spraying, after the larvae have penetrated the bark, has little promise. A spray that could destroy not only the eggs but also the young larvae entering the bark would be most satisfactory and permit delaying the application until after the main egg laying period. No spray of this type is known at present which could be safely recommended for general use. There is always danger that a penetrating material will destroy the cambium as well as the insects and consequently tests with both the insect and the tree species involved are necessary.

There are several materials that have possibilities, such as ortho-dichlorobenzene and Reilly Transparent Penetrating Creosote, various dilutions of which would have to be tried. It would also be well to continue the experiment with kerosene, testing some of the dilutions of kerosene emulsion. An outline of details for a series of spray tests will be prepared if some arrangement can be made to have these experiments carried on next summer.

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